

10/576200

IAP20 Res'd INPTD 17 APR 2006

SPECIFICATION

FOOTWEAR

[Technical Field]

[0001] The present invention relates to a footwear pertaining to athletic shoes. More particularly, the invention is directed to a footwear suited for enhancing and improving an athletic ability and body function of human.

[Background Arts]

[0002] A muscle of a human leg portion is one of the largest muscles in the human body. It is reported that only half of such human leg muscle is used for most of daily activities. In particular, in the case of a person having few opportunities for exercises due to deskwork or the like, a muscle in the inside of his or her thigh portion or a muscle in his or her buttocks portion is prone to wane and it is difficult to strengthen those particular muscle portions. Solution to such problem is attainable by providing an effective way to enhance or stretch the muscles, sufficient to improve the body function and athletic ability. For example, the under-listed prior art literature 1 discloses a footwear for physical exercise purpose, which has a particular sole of such a structure that a forward side (on the toe side) thereof is greater in height than a backward side (on the heel side). Specifically, according to that prior art, the insole of shoe is so formed to provide a downwardly sloped surface which becomes gradually lower as it proceeds from the forward portion thereof to the backward portion thereof. This arrangement of shoes gives a user walking therewith such an experience as if he or she walked on an uphill road generally identical in

inclination angle to the sloped insole, with his or her heel portions being kept in close proximity to a ground surface, thereby providing a proper exercise effect to the user.

The prior art literature 1: Japanese Laid-Open Patent Publication No. Hei 9-164002

[Disclosure of the Invention]

[Problems to be Solved by the Invention]

[0003] The foregoing conventional footwear is certainly effective in improving and enhancing muscles in the backward side of user's leg portion, but entirely ineffective in enhancing and stretching muscles in other parts of the user's body than that leg portion (e.g. muscles in the abdominal portion). Further, as stated above, this sort of footwear inherently includes the high toe region and the low heel region, which in fact makes it difficult for a user to walk in a normal way. That is, basically sated, for the user to walk in a normal way, his or her weight must be shifted in the following orders: the heel, the base of toe, and the tiptoe. But, such shift of weight is not smoothly achieved by the foregoing prior-art shoe insole structure having the high toe region and the low heel region, as a result of which, it is difficult to make such conventional footwear adaptable for use in sports and the like which requires a quick footwork.

[0004] With the above-stated drawbacks in view, it is a purpose of the present invention to provide an improved footwear which is not only suited for improving and enhancing a sports ability required principally for human leg portions, but also suited for preventing a poor bodily functions caused by a lopsided weight in human foot portions.

[Means for Solving the Problems]

[0005] In order to achieve the foregoing purpose, a footwear in accordance with the present invention is characterized by comprising: a first sloped surface defined inside of the footwear, the first sloped surface being inclined such that one side thereof on which a base of toe of human foot is to be positioned is higher than another side thereof near to a heel side of the footwear; a second sloped surface defined in a sole of the footwear, the second sloped surface extending from an area of said sole where the base of toe of human foot is to be positioned, in a direction toward a toe side of the footwear; and a third sloped surface defined inside of the footwear, the third sloped surface being inclined such that one side thereof on which a big toe of human foot is to be positioned is lower than another side thereof on which a small toe of human foot is to be positioned. Further, the footwear is characterized in that at least one functional equipment is provided to the sole of the footwear. Another aspect of the present invention is characterized by comprising: a first sloped surface defined inside of the footwear, the first sloped surface being inclined such that one side thereof on which a base of toe of human foot is to be positioned is higher than another side thereof near to a heel side of the footwear; a second sloped surface defined in a sole of the footwear, the second sloped surface extending from an area of the sole on which the base of toe of human foot is to be positioned, in a direction toward a toe side of the footwear; and at least one functional equipment provided to the sole of the footwear. Still another aspect of the present invention is characterized in that at least one functional equipment is provided to a sole of the footwear, and that the functional equipment is one selected from the group consisting of: rotatable circular plates; rotatable balls; springs; edges; and slidable plates. It should be noted that the

above-stated purpose, features and advantages of the present invention as well as other purposes, features and advantages of the invention will become apparent from reading of the specific descriptions hereinafter, with reference to the annexed drawings.

[Effects of the Invention]

[0006] In accordance with the present invention, there is basically provided a footwear comprising: a first sloped surface defined inside of the footwear, the first sloped surface being inclined such that one side thereof on which a base of toe of human foot is to be positioned is higher than another side thereof near to a heel side of the footwear; and a second sloped surface defined in a sole of the footwear, the second sloped surface extending from an area of the sole where the base of toe of human foot is to be positioned, in a direction toward a toe side of the footwear. In such footwear, a third sloped surface may be defined inside of the footwear, the third sloped surface being inclined such that one side thereof on which a big toe of human foot is to be positioned is lower than another side thereof on which a small toe of human foot is to be positioned. Alternatively, either solely or in combination with that third sloped surface, a functional equipment may be releasably connected with a portion of the sole of footwear at which the base of toe of human foot is to be positioned. Such arrangement of footwear is advantageous in that a user can keep his or her appropriate posture and enhance his or her sports ability, and that it is possible to make any effective use of the footwear to not only prevent development of various symptoms due to a lopsided weight in the foot portions, but also provide symptomatic improvement in that respect. Moreover, in the case where the functional equipment is provided to the second sloped surface, the user can simply shift his or her weight forwards in a direction from the heel side to the toe

side, to thereby permit use of the functional equipment, or conversely, in a direction reverse to such forward weight shift, the user can shift his or her weight so as to avoid use of the functional equipment. Additionally, the use of such functional equipment enables the user to enhance and stretch muscles in his or her leg portions as well as muscles in his or her other body portions.

[Brief Description of the Drawings]

[0007] [Fig. 1] The Fig. 1 is a diagram illustrating a structure of Embodiment 1 of the present invention.

[Fig. 2] The Fig. 2 is a diagram for showing how the foregoing embodiment is used.

[Fig. 3] The Fig. 3 is a diagram for showing how the foregoing embodiment is used.

[Fig. 4] The Fig. 4 is a diagram illustrating principal parts in each of another alternative embodiments of the present invention.

[Description on Reference Numerals in the Drawings]

[0008] 10: shoe
12: shoe sole
12A: recessed portion
14: toe side
16: heel side
18: sloped surface
20: rotating adapter
20A: circular base plate
20B: bearing mechanism

20C: female engagement shaft
20D: engagement hole
30: engagement member
30A: flat plate
30B: male engagement shaft
40: ground plane
50: user
52: thenar eminence
100: spring
102: engagement shaft
110: spiral spring
112: engagement shaft
114, 116: detent plates
120: ball
122: joint
124: engagement shaft
130: ski
132, 134: engagement shafts

[Best Embodiments for Carrying Out the Invention]

[0009] Although there may be many various embodiments of the present invention, hereinafter, an appropriate number of exemplary embodiments of the invention will be specifically described.

Embodiment 1

[0010] First of all, a description will be made of an embodiment 1 in

accordance with the present invention, with reference to Figs. 1 to 3. Fig. 1(A) is a side elevational view showing a structure of the present embodiment. Fig. 1(B) is a front view of the present embodiment as viewed in the direction of arrow F1 in the Fig. 1(A). Figs. 2 and 3 are diagrams illustrative of how the present embodiment is used. As shown in those figures, the illustrated shoe 10 includes a shoe sole 12 having a thickened region defined at a point near to a side forwardly of the shoe in relation to a center of sole of a user's foot; namely, an area of the insole where a base of toe of a user's foot is to be positioned, wherein the term "base of toe" refers to a joint between the toe and instep of user's foot. (Such thickened insole region substantially corresponds to a line extended between a thenar eminence 52 and a hypothenar eminence as seen in Fig. 1(B)). Thus, referring to the state of the shoe in Fig 1(A). the insole of shoe 10, on which the sole of foot of the user 50 is to be contacted, is sloped with respect to a ground plane 40 as indicated by the line LA. As far as the illustrative embodiment is concerned, the ground plane 40 is shown as extending horizontally with a view to facilitating the ease of understanding about the present embodiment. In addition thereto, as viewed from Fig. 1(B), the insole of the shoe 10 is sloped with respect to the ground plane 40, such that one area thereof on which the user's big toe is to be positioned is lower than another area thereof on which the user's little toe is to be positioned, as indicated by the line LB. Further, the shoe sole 12 has a sloped surface 18 which is upturned or extends upwards from one side of the shoe sole on which the afore-said base of toe of user's foot is to be positioned, in a direction toward a toe side 14 where a distal end part of the user's foot is to be positioned.

[0011] Embedded securely in a material of the shoe sole are a plurality of engagement members 30, each being formed from a metallic material and adapted for engagement with a functional equipment to be described later, in

such a manner as to allow a plurality of the functional equipments to be engaged with the respective engagement members at the respective plurality of positions in forward and backward directions of the shoe sole. As shown in Fig. 1(C), the engagement member 30 may comprise a flat plate 30A of square shape and a male engagement shaft 30B adapted for allowing the functional equipment to be releasably engaged therewith, the male engagement shaft 30B erecting from a center of the flat plate 30A. That particular male engagement shaft 30B is exposed in a recessed portion 12A formed in the shoe sole 12. Further, the engagement member 30 is fixed in the shoe sole 12 such that an axis of the engagement shaft 30B thereof is oriented to and aligned with the normal to an outer surface of the shoe sole. That is, the arrangement of the engagement members 30 in the shoe sole 12 is such that, at every local area of the shoe sole 12 which corresponds to each engagement member 30 and is to contact the ground plane 40, any male engagement shaft 30B corresponding thereto is to be substantially perpendicular to the ground plane 40. For example, in accordance with such arrangement of engagement members 30 in the shoe sole 12, when a portion of the shoe sole at which the base of toe of user's foot is to be positioned is only contacted on the ground plane as shown in Fig. 2(A), the male engagement shaft 30B disposed at that particular portion of shoe is substantially perpendicular to the ground plane 40.

[0012] On the other hand, as seen from the enlarged view in Fig. 1(D), a rotating adapter 20 may be provided as one exemplary part of the foregoing functional equipment. Such rotating adapter comprises a female engagement shaft 20C and a circular base plate 20A adapted for contact on the ground plane 40, wherein the circular base plate 20A is rotatably connected with the female engagement shaft 20C via a bearing mechanism 20B. The female engagement shaft 20C has an engagement hole 20D formed therein. This rotating adapter

20 may be releasably and rotatably engaged with the engagement member 30 by inserting the male engagement shaft 30B disposed in the shoe sole 12 into the engagement hole 20D.

[0013] Now, an operation and action of the present embodiment will be described. At first, with reference to Fig. 2(A) and Fig. 3, a description will be made of the case where the rotating adapter 20 is used. In this mode, first of all, the female engagement shaft 20C of the rotating adapter 20 is engaged with the male engagement shaft 30B via the recessed portion 12A. Then, as understandable in Fig. 2(A), a user wearing the shoe stands on tiptoe, with an outer surface of the circular base plate 20A of the rotating adapter 20 being in contact on the ground plane 40. In that instance, as seen in Fig. 3(A), the user can stand on one foot and rotate or spin his or her body, wherein, normally, such rotating or spinning action could hardly be done without some optimum condition including the case where the user stands on the ice of a low degree of μ (the μ is a friction resistance) or the case where the user stands on a slippery polished floor. Alternatively, as shown in Fig. 3(B), the user can stand on both feet and take an exercise like twist dance. Accordingly, it is possible for the user to train a sense of balance by taking the spinning exercise stated above. Or, alternatively, by taking the twist-dance exercise stated above, the user can easily do a "twisting" action which is not done so much in his or her daily activities. In a normal twisting action, an oblique abdominal muscle is mainly used. But, a user wearing a pair of the shoes 10 of the present embodiment can efficiently stimulate his or her oblique abdominal muscles that have not been used for years due to aging or insufficient exercise, whereby, for example, the following effects can be expected: preventing and relieving a low back pain; enhancing muscles in the waist portion; reducing fat in the waist portion; and relieving constipation. It is noted here that, when it is desired to use the

rotating adapter 20, the user may shift his or her weight toward the toe side 14 of the shoe, and on the other hand, if it is unnecessary to use the rotating adapter 20, the user may shift his or her weight toward the heel side 16 of the shoe, or may remove the rotating adapter 20 from the shoe.

[0014] Next, a description will be made of an instance where the shoe is used without the rotating adapter 20. Suppose that a user removes the rotating adapter 20 from the shoe 10 of the present embodiment, and wears such shoe 10 without the rotating adapter 20 to walk or take a physical exercise. In that instance, generally stated, a normal use state of the shoe wherein a whole of the shoe is placed and contacted on the ground plane may be depicted in Fig. 1(A), whereas on the other hand, a stepping state of the shoe wherein the user wearing the shoe is about to step on the ground plane for a certain action may be depicted in Fig. 2(B). First of all, reference is made to Fig. 1(A) which is indicative of the state where a user wearing the shoe stands up, with a whole of the shoe being contacted on the ground plane. In that instance, the heel side 16 of the shoe is low, and therefore, it follows that the sole of user's foot in the shoe slopes upwardly as it proceeds to a forward end thereof. With this upward inclination of insole which causes such upward slope of foot sole, the user will fall down backward unless he or she changes his or her posture, and therefore, a natural body reaction of the user responsive thereto will work to incline the body forwardly to counterbalance such upward inclination of sole so as to keep the user's balance. In that way, it is to be seen that the user wearing the shoe inclines his or her body forwardly, and, under that state, calf muscles of the user are slightly extended (or stretched). On the other hand, let us assume that the user wearing the shoe is in the process of walking. In this instance, each time the user takes a step, the sole of the user's foot undergoes a correction effect within the shoe, which acts on the user's foot and leg portions, such that a

weighted center on that foot sole is shifted to an inward side of the user's foot and thus transformed into an inward weight being applied in a direction inwardly of the user's foot. This effectively allows the user to increase his or her stepping force. Further, by the virtue of the inclined insole state indicated by the line LB in Fig. 1(B), the thus-attained inward weight is maintained, which makes it possible to prevent and remedy bow-legs, knock-knees and a combination of bow-legs and knock-knees. Hence, with the arrangements described above, the user can walk, with his or her calves being stretched to a certain degree, in which case, a limitation is given to a range in which the muscles of the calves can act and move, with the result that, to compensate for such limited movement of calf muscles, a reactive movement is caused in muscles in a backward region of user's thigh portion (i.e. biceps femoris muscle) and/or in muscles of user's hip portion (i.e. gluteus maximus). It is therefore possible to attain a stretching effect to those muscles, as well. Or, instead of such walking, the user wearing the shoe may wish to stop and stand on the toes. In that instance, it is to be seen that the user stands only on a portion of the shoe where the base of toe of his or her foot is positioned, or more clearly stated, the user stands on a local point corresponding to the sloped surface 18 of shoe sole 12 which faces downwards. Under such state, the user can either stand upright or effect a footwork training with respect to the line extended between the thenar eminence and the hypothenar eminence.

[0015] As described above, according to the Embodiment 1, it is appreciated that the insole of the shoe 10 is provided with: a slope inclined such that one area of the insole on which the base of toe of user's foot is to be positioned is higher than another area of the insole near to the heel side 16; a slope inclined such that one area of the insole on which a big toe of user's foot is to be positioned is lower than another area of the insole on which a small toe of user's

foot is to be positioned; and a sloped surface 18 which is turned up from the foregoing insole area where the base of toe of user's foot is to be positioned, in a direction toward the toe side 14. Further, the rotating adapter 20 is releasably connected with a point of the shoe sole 12 which corresponds to such insole area where the base of toe of user's foot is to be positioned. Accordingly, the following effects are attainable:

(1) While standing upright, a user can shift his or her weight in a direction from the heel side of the shoe to the toe side of the shoe, thereby giving a certain unusual stimulation to the muscles and/or motor nerves, which enables the user to strengthen a force of the muscle and attain an improved flexibility of his or her body. Hence, it is possible to enhance and improve the user's physical capabilities and functions. Further, with the shoe(s), the user can stand upright while giving his or her weight mainly to the heel side, which is for example effective in preventing and remedying hallux valgus.

(2) The aforementioned inward weight is always exerted on the user's foot or feet. Thus, in the process of walking, the user uses a greater force than usual to shift the inward weight forward, thereby enhancing his or her muscle force for taking steps. It is therefore, for example, possible to prevent development of bow-legs or knock-knees due to a lopsided weight caused in the user's feet, and also remedy a developed bow-legs or knock-knees.

(3) By use of the rotating adapter 20, the user can take a rotating exercise or twist-dance exercise, thereby moving and stretching other parts of his or her body than the leg portions.

(4) The user can simply shift his or her weight forwards in a direction from the heel side 16 to the toe side 14, to thereby permit use of the rotating adapter 20. Or, alternatively, in a direction reverse to such forward weight shift, the user may shift his or her weight so as to avoid use of the rotating adapter 20.

(5) In a portion of shoe sole 12 where the base of toe of user's foot is to be

positioned, the female engagement shaft 20 of the rotating adapter 20 is securely disposed slantwise, which means that there is no need for unnecessary increase of thickness of that particular portion of shoe sole, thereby avoiding degradation and limited feasibility of design.

[0016] It should be understood that a great number of other embodiments may be contemplated within the scope of the present invention, and therefore, the above-described shoe(s) of the present invention may be modified in a variety of another fashions along the line with the foregoing disclosure. For instance, such modification includes the following aspects:

(1) The elements and materials forming the above-described embodiments are used by way of example and may be replaced by other elements and materials appropriately as required. For example, a natural leather material, a synthetic leather material or cloth material may be used to form the main body portion of the shoe 10, while the shoe sole 12 be formed from a rubber or the like. Also, the illustrated materials forming the rotating adapter 20 and engagement member 30 are used by way of example and may be replaced by any other suitable material having a strength sufficient to withstand a weight of the user 50 so as not to be deformed thereby. Further, the colors and patterns of those materials may be changed appropriately as required.

[0017] (2) In the previously described embodiments, the rotating adapter 20 is used as one mode of the functional equipment, but, in place thereof, for example, one of the following items may be used as an alternative mode of the functional equipment: a spike (or clamber), a ball, a roller, a spring, and an edge. Fig. 4 illustrates some exemplary modes of such alternative functional equipments. With reference to an example in Fig. 4(A), one alternative mode of the functional equipment is shown as comprising a generally U-shaped spring 100 and an

engagement shaft 102 provided to that spring. Referring to an example in Fig. 4(B), it is seen that an engagement shaft 112 is provided to a spiral spring 110, thereby forming an alternative mode of the functional equipment. Specifically, two detent plates 114 and 116 are provided to the respective two sides of the spring 110, and the engagement shaft 112 is connected with the detent plate 116. With reference to an example in Fig. 4(C), a ball (a spherical element) 120 is rotatably secured in a joint 122, thereby forming an alternative mode of the functional equipment. In this mode, an engagement shaft 124 is provided to a top of the joint 122. Fig. 4(D) shows an example wherein two engagement shafts 132 and 134 are provided to a ski 130 for grass skiing, thereby forming an alternative mode of the functional equipment. In this particular mode, a pair of the engagement members 30 should necessarily be provided in the shoe sole 12 in order to permit engagement thereof with the respective two engagement shafts 132 and 134. In this context, the two engagement shafts 132 and 134 may be connected with an edge for skate, instead of with the ski 130.

[0018] (3) Two different functional equipments may be chosen from among the above-described functional equipments and respectively engaged with a pair of the shoes 10 which are to be worn by the respective left and right feet of user. Or, a plurality of different functional equipments be engaged with each of the two shoes 10. It is also noted that the above-described structure of the engagement member 30 is just one exemplary mode of the present invention, and the same goes for the above-described arrangements by which the functional equipments, including the rotating adapter 20, can be engaged with the engagement member 30. Thus, any other alteration may be applied to those engagement member 30 and functional equipments, insofar as it achieves the same effects as previously described. For example, in order to connect the functional equipment with the engagement member 30, each of the following

arrangements may be optional. Namely, a convex element and a concave element may be arranged appropriately between the engagement member 30 and the functional equipment, so as to allow engagement of the convex element with the concave element. Or, bolts and nuts may be arranged appropriately for connection of the functional equipment with the engagement member 30. Or, a magnet be used for that purpose. In particular, if the magnet is used as an alternative to the engagement member 30, a magnetism therefrom will act on a user's foot, so that some advantageous effects to the foot can be expected.

[0019] (4) The footwear disclosed in the present invention is indeed suited for enhancing physical capabilities of user in association with: a sport of the type requiring abrupt dash and stop, which includes tennis, baseball, basketball and volleyball; a sport of the type requiring instantaneous force, which includes a running long jump and a running high jump; and a sport of the type requiring a training of user's heel portion to exert his or her ability, such as golf, judo, and weightlifting. However, the footwear of the present invention is not limited to the sports, but may be used as a usual footwear. Also, the footwear of the present invention may be used for dance or skate.

[Applicability of the Invention for Industrial Uses]

[0020] In accordance with the present invention, there is basically provided a footwear comprising: a first sloped surface defined inside of the footwear, the first sloped surface being inclined such that one side thereof on which a base of toe of user's foot is to be positioned is higher than another side thereof near to a heel side of the footwear; and a second sloped surface defined in a sole of the footwear, the second sloped surface extending from an area of the sole where the base of toe of user's foot is to be positioned, in a direction toward a toe side of the

footwear. In such footwear, a third sloped surface may be defined inside of the footwear, the third sloped surface being inclined such that one area of the insole, on which a big toe of user's foot is to be positioned is lower than another area of the insole on which a small toe of user's foot is to be positioned. Alternatively, solely or in combination with that third sloped surface, a functional equipment stated above may be releasably connected with a portion of the sole of footwear at which the base of toe of user's foot is to be positioned. Such arrangement of footwear is advantageous in that a user can keep his or her appropriate posture, and that the user can simply shift his or her weight forwards in a direction from the heel side to the toe side, to thereby permit use of the functional equipment, or the user can shift his or her weight in a direction reverse to such forward weight shift so as to avoid use of the functional equipment. Accordingly, it is possible to make the footwear of the present invention adaptable for use in various kinds of sports. In particular, the sole of the footwear has the sloped surface, by virtue of which, it is possible to eliminate the need for increasing the thickness of the footwear sole in the case where a functional member is embedded in that particular footwear sole. Hence, the thickness of the footwear sole is not increased, irrespective of the functional member being embedded therein, which effectively attains a good aesthetic appearance of the footwear. Accordingly, the footwear of the present invention deserves a design-oriented footwear.